5

Treatment Manual

Treatment Schedules

T500 - Schedules for Plant Pests or Pathogens

Contents

The following Schedules are listed by plant pest or pathogen

The following section lists the recommended treatments or actions to be applied to items or commodities found infected with various diseases, or infested with various plant pests including nematodes. Commodities may include cut flowers and greenery, propagative plant materials, as well as entire plants. Due to recent restrictions and prohibitions on the use of certain chemicals, every effort has been made to substitute the best alternative treatment available to us. The diseases and commodities for which these treatments are recommended are listed in the Index to Schedules and with the following treatment schedules. Ports should endeavor to make post-treatment examinations or arrange to have the consignee or importer submit data concerning the material following the treatment. Ports should forward any information of this nature to:

Center for Plant Health Science & Technology
USDA-APHIS-PPQ-CPHST
Treatment Support & Certification
1017 Main Campus Drive, Suite 2500
Raleigh, NC 27606

General Schedules

T501—Treatment for infestation of Chrysomyxa spp., Cercospora spp., and Phoma chrysanthemi on various commodities

T501-1 Azalea

Pest: *Chrysomyxa spp.*

Treatment: T501-1 Remove infected parts and treat all plants of same species in shipment with 4-4-50 Bordeaux dip or spray.

See alternative treatment **T501-1** for *Chrysomyxa* spp.

T501-2 Azaleodendron

Pest: *Chrysomyxa spp.*

Treatment: T501-2 Remove infected parts and treat all plants of same species in shipment with 4-4-50 Bordeaux dip or spray.

See alternative treatment **T501-1** for *Chrysomyxa* spp.

T501-4 Chrysanthemum

Pest: ***Phoma chrysanthemi***

Treatment: T501-4 Remove infected parts and treat all plants of same species in shipment with 4-4-50 Bordeaux dip or spray.

T501-5 Christmas trees

Pest: ***Phoma chrysanthemi***

Treatment: T501-5 Remove infected parts and treat all plants of same species in shipment with 4-4-50 Bordeaux dip or spray.

T501-3 Orchid

Pest: *Cercospora spp.*

Treatment: T501-3 Remove infected parts and treat all plants of same species in shipment with 4-4-50 Bordeaux dip or spray.

T501-6 Rhododendron

Pest: *Chrysomyxa* spp.

Treatment: T501-6 Remove infected parts and treat all plants of same species in shipment with 4-4-50 Bordeaux dip or spray.

See alternative treatment **T501-2** for *Chrysomyxa* spp.

T502—Treatment for infestation of Potato cyst nematode on various commodities

T502-1 Bags and bagging used for commodities grown in soil

Pest: Potato cyst nematode

Treatment: T502-1 Methyl bromide—8 lbs/1,000 ft^3 for 16 hours in 26" vacuum at 40°F or above.

T502-2 Covers used for commodities grown in soil

Pest: Potato cyst nematode

Treatment: T502-2 Methyl bromide—8 lbs/1,000 ft^3 for 16 hours in 26" vacuum at 40°F or above.

T502-3 Soil

Pest: Potato cyst nematode

Treatment: T502-3 Methyl bromide—8 lbs/1,000 ft^3 for 16 hours in 26" vacuum at 40°F or above.

T503—Treatments for Infestations of Downy Mildews and Physoderma diseases of Maize

T503-1 Bags and bagging (used) for small grains

Pest: Diseases listed in 7CFR 319.24: Downy Mildews and Physoderma diseases of Maize

Alternative treatments:

Treatment: T503-1-2 Hot water treatment—soak in water slightly below boiling (212°F) for 1 hour.

Treatment: T503-1-3 Live steam for 10 minutes at 240°F, NAP. For baled material, live steam at 10 pounds pressure for 20 minutes.

Treatment: T503-1-4 Dry heat at 212°F for 1 hour. Treat small bales only.

T503-2 Covers used for small grains

Pest: Diseases listed in 7CFR 319.24: Downy Mildews and Physoderma diseases of Maize

Alternative treatments:

Treatment: T503-2-2 Hot water treatment—soak in water slightly below boiling (212°F) for 1 hour.

Treatment: T503-2-3 Live steam for 10 minutes at 240°F, NAP. For baled material, live steam at 10 pounds pressure for 20 minutes.

Treatment: T503-2-4 Dry heat at 212°F for 1 hour. Treat small bales only.

T504—Treatment for Infestation of Flag Smut on various commodities

T504-1 Bags and bagging (used) for small grains

Pest: Flag smut

Alternative treatments:

Treatment: T504-1-1 Dry heat at 212°F for 1 hour. Treat small bales only.

Treatment: T504-1-2 Steam at 10 pounds pressure at 242°F (114°C) for 20 minutes.

T504-2 Covers used for wheat

Pest: Flag smut
Alternative treatments:

Treatment: T504-2-1 Dry heat at 212°F for 1 hour. Treat small bales only.

Treatment: T504-2-2 Steam at 10 pounds pressure at 242°F (114°C) for 20 minutes.

T505—Treatment for Infestation of Chrysomyxa spp. on various commodities

T505-1 Azaleodendron

Pest: Chrysomyxa spp.
Alternative treatments:

Treatment: T505-1-1 Treat with mancozeb or other approved fungicide ofequal effectiveness. (Use label instructions for treatment.)

Treatment: T505-1-2 See alternative treatment T501

T505-2 Rhododendron

Pest: Chrysomyxa spp.
Alternative treatments:

Treatment: T505-2-1 Treat with mancozeb or other approved fungicide ofequal effectiveness. (Use label instructions for treatment.)

Treatment: T505-2-2 See alternative treatment T501-1.

T506—Treatment for Infestation of Potato Cyst Nematode on various commodities

T506-1 Containers

Pest: Potato cyst nematode
Alternative treatments:

Treatment: T506-1-1 MB ("Q" label only) in 26" vacuum

Temperature	Dosage Rate (lb/1,000 ft^3)	Exposure Period
40°F or above	8 lbs	16 hrs
OR	10.5 lbs	12 hrs
OR	16 lbs	8 hrs

Treatment: T506-1-3 High pressure steam. See nonplant articles T506C.

T506-2 Nonplant articles

Pest: Potato cyst nematode
Alternative treatments:

Treatment: T506-2-1 MB ("Q" label only) in 26" vacuum

Temperature	Dosage Rate (lb/1,000 ft^3)	Exposure Period
40°F or above	8 lbs	16 hrs
OR	10.5 lbs	12 hrs
OR	16 lbs	8 hrs

Treatment: T506-2-3 High pressure steam.

Live steam is introduced into a closed chamber containing the material to be treated until the required temperature and pressure are indicated. The temperature/pressure relationship is maintained at or above this point for the required exposure period. The exposure period will depend on the nature of the material, quantity, and its penetrable condition.

For loose masses of material which permit rapid and complete penetration of steam to all parts of the mass, no initial vacuum is needed but air must be released until steam vapor escapes, and exposure at 20 pounds pressure for 10 minutes, 15 pounds for 15 minutes, or 10 pounds for 20 minutes is sufficient.

For closely packed material, such as soil, special measures are needed to ensure rapid heat penetration to all parts of the material. Soil, if in large containers, will not allow adequate treatment under normal sterilization exposure periods. Quicker penetration of the steam is obtained by first exhausting the air in the chamber to a high vacuum and then introducing live steam until the required positive pressure is reached.

T507—Treatment for Infestation of *Phyllosticia bromeliae*, *Uredo* and *Septoria gentinae* on various commodities

T507-1 Bromeliads

Pest: ***Phyllosticta bromeliae Uredo*** spp. (when destined to Florida, refuse entry)

Treatment: T507-1 Remove infected leaves and treat all plants of same species in shipment with Captan following label directions.

Advise importer or consignee that treatment may cause commodity damage.

T507-2 *Gentiana*

Pest: ***Septoria gentinae***

Treatment: T507-2 Remove infected leaves and treat all plants of same species in shipment with Captan following label directions.

Advise importer or consignee that treatment may cause commodity damage.

T508—Treatment for Infestation of Rusts on various commodities

T508-1 Orchids (to Florida)

Pest: Rusts

Treatment: T508-1 ***For rust-infected shipments to Florida:*** Refuse entry to all infected plants and all other plants of the same species or variety in the shipment. Treat other orchid species in the shipment (which may have become contaminated) with Captan. Repackage treated orchids in clean shipping containers. For rusts on orchids to States other than Florida, follow the procedures in T509.

T509—Treatment for Infestation of Various Plant Pests of Camellia and Orchids

T509-1 Camellia

Pest: ***Cylindrosporium camalliae***
Alternative treatments:

Treatment: T509-1-1 ***Light infection:*** Remove infected leaves and dip or spray plant with 4-4-50 Bordeaux. Dry quickly and thoroughly before release.

Treatment: T509-1-2 ***Heavy infection:*** Refuse entry.

T509-2 Orchids

Pest: ***Hemileia*** spp.
Leptosphaeria spp.
Mycosphaerella spp.
Opiodothella orchidearum
Phomopsis orchidophilia
Phyllachora spp.
Phyllosticta spp.
Sphenospora spp.
Sphaerodothis spp.
Uredo spp. (except ***U. scabies***)
Alternative treatments:

Treatment: T509-2-1 ***Light infection:*** Remove infected leaves and dip or spray plant with 4-4-50 Bordeaux. Dry quickly and thoroughly before release.

Treatment: T509-2-2 ***Heavy infection:*** Refuse entry.

T510—Treatment for Infestation of various Corn-Related diseases

T510-1 Corn (seed) (Commercial lots (not for propagation))

Pest: Various corn-related diseases

Treatment: T510-1 Live steam from jet or nozzle into loose masses of material until all parts reach 212°F.

T510-2 Corn (seed) (Small lots for propagation but not for food, feed, or oil purposes)

Pest: Various corn-related diseases

Treatment: T510-2 Treat seeds with a dry application of Mancozeb in combination with Captan. Disinfect bags by: 1) Dry heat at 212°F for 1 hour. Treat small bales only; or 2) Steam at 10 pounds pressure at 40°F for 20 minutes.

T511—Precautionary treatment for Infestations of Xanthomonas axonopodis, pv. citri (citrus canker)

T511-1 Citrus and other Rutaceous seeds from citrus canker countries

Pest: ***Xanthomonas axonopodis***, pv. ***citri*** (citrus canker)

Treatment: T511-1 Seeds shall be treated for possible infection with citrus canker bacteria by first washing the seeds if any mucilaginous materials is adhering. Next, immerse the seeds in water at 125 degree F or higher for 10 minutes. Then immerse seed for a period of at least 2 minutes in a 0.525% sodium hypochlorite (Clorox) solution at a pH of 6.0 to 7.5. Drain, dry and repack near original moisture content.

Important

A 0.525% sodium hypochlorite solution is prepared by diluting 1 part Clorox (containing 5.25% sodium hypochlorite) in 9 parts of water. If using "ultra strength" chlorine bleach, use only 3/4 as much bleach.

T512—(Deleted)

T513—Treatment for Infestations of Ascochyta on various commodities

T513-1 Orchids

Pest: ***Ascochyta*** spp.

Treatment: T513-1 Defoliate if leaf-borne only; refuse entry if pseudo-bulbs infected.

T514—Treatment for Infestations of *Xanthomonas albilineans* and *X. vasculorum*

T514-1 Saccharum (sugarcane) (Seed pieces)

Pest: ***Xanthomonas albilineans and X. vasculorum***

Treatment: T514-1 Presoak in water at room temperature for 24 hours then immerse in water at 122°F for 3 hours.

This treatment may damage sprouted cane.

T514-2 Saccharum (sugarcane) (True seed (fuzz))

Pest: ***Xanthomonas albilineans and X. vasculorum***

Treatment: T514-2 Immerse in 0.525 percent sodium hypochlorite solution for 30 minutes followed by at least 8 hours air drying before packaging. (Dilute 1 part Clorox or similar solution containing 5.25 percent sodium hypochlorite; if using “ultra strength” chlorine bleach, use only 3/4 as much bleach).

T514-3 Saccharum (sugarcane) (Bagasse)

Pest: ***Xanthomonas albilineans and X. vasculorum***

Treatment: T514-3 Dry heat treatment for 2 hours at 158°F.

T514-4 Saccharum (sugarcane) (Field and processing equipment)

Pest: ***Xanthomonas albilineans and X. vasculorum***

Treatment: T514-4 Remove all debris and soil from equipment with water at high pressure (300 pounds per square inch minimum) or with steam.

T515—Treatment for Infestations of various Sugarcane-Related diseases

T515-1 Sugarcane (Baled)

Pest: Various sugarcane-related diseases
Alternative treatments:

Treatment: T515-1 Introduce live steam into 25" vacuum until pressure reaches 15 to 20 pounds. Hold until center of bale is 220°F–230°F and maintain for 30 minutes.

T515-2-1 Sugarcane (Loose Sugarcane)

Treatment: T515-2-1 Introduce steam into 25" vacuum (or if with initial vacuum, “bleed” air until steam vapor fills chamber).

T515-2-3 Sugarcane (Loose Sugarcane)

Treatment: T515-2-3 Dry heat—212°F for 1 hour.

T515-2-4 Sugarcane (Loose Sugarcane)

Treatment: T515-2-4 Pulped in water at 190°F–205°F, followed by drying at 212°F for 1 hour.

T515-2-5 Sugarcane (Loose Sugarcane)

Treatment: T515-2-5 Flash heated to 1,000°F (Arnold dryer).

T516 (Deleted)

T517 (Deleted)

T518—Treatment for Infestations of Various Rice-Related diseases

T518-1 Brooms made of rice straw

Pest: Various rice-related diseases

Treatment: T518-1 Dry heat at 170°F for 4.5 hours—may take 2 hours to reach this temperature.

T518-2-1 Novelties made of rice straw

Two alternative treatments

Pest: Various rice-related diseases

Treatment: T518-2-1 Dry heat at 180°F–200°F for 2 hours

T518-2-2 Novelties made with rice straw

Pest: Various rice-related diseases

Treatment: T518-2-2 Steam sterilization

Temperature	Pressure	Exposure Period
260°F	20 lbs	15 minutes
250°F	15 lbs	20 minutes

T519—Treatment for Infestations of Various Rice-Related diseases

T519-1 Closely packed rice straw and hulls

Pest: Various rice-related diseases

Treatment: T519-1 Introduce steam into 28" vacuum until pressure reaches 10 pounds and hold for 20 minutes.

T519-2 Loose rice straw and hulls

Pest: Various rice-related diseases

Treatment: T519-2 Introduce steam into 28" vacuum (or if without initial vacuum, “bleed” air until steam vapor escapes) until pressure reaches 20 pounds AND temperature 259°F and hold for 10 minutes (OR 10 pounds and 240°F for 20 minutes).

See also **T518-1**.

T520—Treatment for Infestation of Verticillium albo-atrum on various commodities

T520-1 Seeds of alfalfa (*Medicago falcata, M. gaetula, M. glutinosa, M. media, and M. sativa*) from Europe

Pest: ***Verticillium albo-atrum***
Alternative treatments:

Treatment: T520-1-1 Dust with 75 percent Thiram at the rate of 166 grams per 50 kilograms of seed (3.3g/kg).

Treatment: T520-1-2 Treat with a slurry of Thiram 75 WP at a rate of 166 grams per 360 milliliters of water per 50 kilograms of seed (3.3g pesticide/7.2ml water/kg seed).

Hot Water Treatments

T551—Treatment for Infestation of Globodera rostochiensis and G. pallida (Nematodes) on Convallaria (pips)

T551-1 Convallaria (pips)

Pest: ***Globodera rostochiensis, G. pallida***

Treatment: T551-1 Keep pips frozen until time for treatment, then thaw enough to separate bundles one from another just before treatment begins. Without preliminary warm-up, immerse in hot water at 118°F for 30 minutes, following with a 5 minute drain, finishing with 5 minutes cooling dip or hosing with tap water.

T552—Treatment for Infestation of *Ditylenchus dipsaci and D. destructor*

T552-1 *Allium, Amaryllis,* and Bulbs (NSPF)

Pest: Bulb nematodes: *Ditylenchus dipsaci, D. destructor*

Treatment: T552-1 Presoak bulbs in water at 75°F for 2 hours, then at 110°F–111°F for 4 hours.

T553—Treatment for Infestations of Nematodes on various plant commodities

T553-1 **Achimenes, Actinidia, *Agapanthus, Aloe, Amorphophallus* (bulbs), *Ampelopsis, Anchuse, Anemone, Astilbe, Begonia* (tubers), *Bletilla hyacinthina* (bulbs) (NSPF), Cactus, Calliopsis, *Campanula, Cestrum*, *Cimicifuga, Cissus, Clematis, Convolvulus japonicus*, Corytholoma, *Curcuma* (turmuric), *Cyclamen, Cytisus*, Dahlia (tubers), *Dracaena*, *Epimedium pinnatum* (only; other spp. not tolerant), *Euonymus alata* (only), *Eupatorium, Euphorbia, Fragaria* (strawberry), Gardenia, *Gentiana*, *Gerbera*, Gesneria, *Geum, Gladiolus*, *Heliopsis, Helleborus, Hibiscus, Hosta, Hoya, Iris, Jasminum*, Kaempferia, Kohleria, Naegelia, Orchid, *Ornithogalum, Paeonia*, *Passiflora*, Polyanthes (tuberose), *Primula*, Reichsteineria, *Sansevieria, Scabiosa*, *Sedum,* Senecio (Lingularis), Thompsonia nepalensis, Tydaea, *Verbena, Vitis* (grape), *Weigela, Zantedeschia*, Zingiberaceae**

Pest: Root-knot nematodes (*Meloidogyne* spp.)

Treatment: T553-1 Hot water at 118°F for 30 minutes.

T553-2 ***Anchusa, Astilbe, Clematis, Dicentra, Gardenia, Helleborus, Hibiscus, Kniphofia, Primula***

Pest: Lesion nematodes (*Pratylenchus* spp.)

Treatment: T553-2 Hot water at 118°F for 30 minutes.

T553-3 **Armoracea (horseradish roots), bulbs (NSPF)**

Pest: Golden nematodes (*Globodera rostochiensis* and *G. pallida*)

Treatment: T553-3 Hot water at 118°F for 30 minutes.

T553-4 ***Bletilla hyacinthina* (alternate treatment: T564)**

Pest: Foliar nematodes (*Aphelenchoides fragariae*)

Treatment: T553-4 Hot water at 118°F for 30 minutes.

T553-5 **Humulus**

Pest: Cyst nematodes (*Heterodera humuli*)

Treatment: T553-5 Hot water at 118°F for 30 minutes.

T554—Treatment for Infestations of Ditylenchus dipsaci and D. destructor on Hyacinthus

T554-1 *Hyacinthus* (bulbs), *Iris* (bulbs and rhizomes), *Tigridia*

Pest: Bulb nematodes—*Ditylenchus dipsaci* and *D. destructor*

Alternative treatments

Treatment: T554-1-1 Presoak in water at 70°F–80°F for 2.5 hours, followed by hot water immersion at 110°F–111°F for 1 hour.

Treatment: T554-1-2 Hot water immersion at 110°F–111°F for 3 hours with no presoaking.

T555—Treatment for Infestations of Ditylenchus dipsaci on *Narcissus*

T555-1 *Narcissus* (bulbs)

Pest: Bulb nematodes—*Ditylenchus dipsaci*

Treatment: T555-1 Presoak in water at 70°F–80°F for 2 hours, then at 110°F–111°F until all bulbs reach that temperature and hold for 4 hours.

T556—Treatment for Infestations of Root-knot nematodes (*Meloidogyne* spp.) on *Calla*

T556-1 *Calla* (rhizomes)

Pest: Root-knot nematodes (*Meloidogyne* spp.)

Treatment: T556-1 Dip in hot water at 122°F for 30 minutes.

T557—Treatment for Infestations of *Meloidogyne* spp. and *Pratylenchus* spp. on *Chrysanthemum* (not including *Pyrethrum*)

T557-1 *Chrysanthemum* (not including *Pyrethrum*)

Pest: *Meloidogyne* spp. and *Pratylenchus* spp.

Treatment: T557-1 Dip in hot water at 118°F for 25 minutes.

T558—Treatment for Infestations of *Pratylenchus* surface diseases on *Fragaria* (strawberry)

T558-1 *Fragaria* (strawberry)

Pest: *Pratylenchus* spp. (surface diseases)

Treatment: T558-1 Dip in hot water at 127°F for 2 minutes.

T559—Treatment for Infestations of Foliar Nematodes on *Begonia* and *Oryza* (paddy rice)

T559-1 *Begonia*

Pest: White tip nematode (*Aphelenchoides besseyi)*

Treatment: T559-1 Dip in hot water at 118°F for 5 minutes.

T559-2 *Oryza* (paddy rice)

Pest: White tip nematode (*Aphelenchoides besseyi)*

Treatment: T559-2 Dip in hot water at 132.8°F (56°F) for 15 minutes.

T560—Treatment for Infestations of *Meloidogyne* spp. on *Rosa*

T560-1 *Rosa* spp. (except *multiflora*, which is not tolerant)

Pest: *Meloidogyne* spp.

Treatment: T560-1 Dip in hot water at 123°F for 10 minutes.

T561—Treatment for Infestations of *Cercospora mamaonis* and *Phomopis carica-papayae* on Papayas

T561 Papayas

Pest: *Cercospora mamaonis* and *Phomopis carica-papayae*

Treatment: T561-1 Dip in hot water at 120.2°F (49°C) for 20 minutes.

T562—(deleted)

T563—(deleted)

T564—Treatment for Infestations of Foliar Nematodes on various commodities

T564-1 *Astilbe, Bletilla hyacinthina, Cimicifuga, Epimendium pinnatum* (only; other spp. not tolerant), *Hosta, Paeonia*

Pest: Foliar nematode (*Aphelenchoides besseyi*)

Treatment: T564-1 Presoak in water at 68°F for 1 hour followed by hot water soak at 110°F for 1 hour. Then dip in cold water and let dry.


Important

See Alternative treatment for **Bletilla hyacinthina**: T553-1

T565—Treatment for Infestations of Nematodes on various commodities

T565-1 Amaryllis

Pest: ***Ditylenchus destructor***

Treatment: T565-1 Hot water at 110°F for 4 hours. (Should be done immediately after digging.)

T565-2 Crocus

Pest: ***Aphelenchoides subtenuis, Ditylenchus destructor***

Treatment: T565-2 Hot water at 110°F for 4 hours. (Should be done immediately after digging.)

T565-3 Gladiolus

Pest: ***Ditylenchus destructor***

Treatment: T565-3 Hot water at 110°F for 4 hours. (Should be done immediately after digging.)

T565-4 Scilla

Pest: ***Ditylenchus dipsaci***

Treatment: T565-4 Hot water at 110°F for 4 hours. (Should be done immediately after digging.)

T565-5 *Solanum* (potato tubers)

(see Restricted Entry Orders, Part 321)

Pest: ***Globodera rostochiensis, G. pallida***

Treatment: T565-5 Hot water at 110°F for 4 hours. (Should be done immediately after digging.)

T566—Treatment for Infestations of various diseases on Broomcorn, Broomcorn Articles, and Libium (bulbs)

T566-1 Broomcorn

Pest: Precautionary treatment for corn-related diseases

Treatment: T566-1 Hot water at 102°F.

T566-2 Broomcorn Articles

Pest: Precautionary treatment for corn-related diseases

Treatment: T566-2 Hot water at 102°F.

T566-3 Libium (bulbs)

Pest: *Aphelenchoides fragariae*

Treatment: T566-3 Hot water at 102°F.

T567—Treatment for Infestations of Bulb nematodes on various commodities

T567-1 *Muscari, Ornithogalum, Polyanthes* (tuberose)

Pest: Bulb nematodes (*Ditylenchus dipsaci*)

Treatment: T567-1 Dip in hot water at 113°F for 4 hours.

T568—Treatment for Infestations of Foliar nematodes on Senecio

T568-1 Senecio (Lingularis)

Pest: Foliar nematodes (*Aphelenchoides fragariae*)

Treatment: T568-1 Treat with hot water at 110°F for 1 hour.

T569—Treatment for Infestations of Foliar nematodes on *Fragaria* (strawberry)

T569-1 *Fragaria* (strawberry)

Pest: Foliar nematodes (*Aphelenchoides fragariae*)

Treatment: T569-1 Hot water at 121°F for 7 minutes. (National Plant Board Conference, Tennessee, 1968)

T570—Treatment for Infestations of various diseases Acalypha and Aconitum

T570-1 Acalypha

Pest: *Pratylenchus* spp.

Treatment: T570-1 Hot water dip at 110°F for 50 minutes. (Tolerance not established.)

T570-2 Aconitum

Pest: ***Aphelenchoides fragariae*** spp.

Treatment: T570-2 Hot water dip at 110°F for 50 minutes. (Tolerance not established.)

T571—(Deleted)